

## Claim

1. An organic thin film transistor (OTFT), comprising:  
5 a substrate (1),  
a gate electrode (2) formed on the substrate (1),  
a gate insulation layer formed on the gate electrode,  
a source electrode (5) and a drain electrode (6) formed on the gate insulation  
layer including a first insulation layer (3) and a second insulation layer (4) with  
10 different dielectric constants, and  
an active layer (7) which overlays the source electrode (5) and the drain  
electrode (6).
2. The organic thin film transistor according to claim 1, wherein the dielectric  
constant of the first insulation layer (3) is higher than that of the second insulation  
15 layer (4).
3. The organic thin film transistor according to claim 2, wherein the dielectric  
constant of the first insulation layer (3) is at least three times higher than that of the  
second insulation layer (4).
4. The organic thin film transistor according to claim 1, wherein the said first  
20 insulation layer (3) is made of organic, inorganic or ferroelectric material.
5. The organic thin film transistor according to claim 4, wherein the said organic  
material is polyvinylidene fluoride.
6. The organic thin film transistor according to claim 4, wherein the said  
inorganic material is a metal oxide selected from a group consisting of  $\text{Ta}_2\text{O}_5$ ,  $\text{Al}_2\text{O}_3$   
25 and  $\text{TiO}_2$ .
7. The organic thin film transistor according to claim 4, wherein the said  
ferroelectric material is barium titanate.
8. The organic thin film transistor according to claim 4, wherein the said second  
insulation layer (4) is made of organic polymer material or inorganic material.
- 30 9. The organic thin film transistor according to claim 8, wherein the said organic  
polymer material is poly(methyl methacrylate), polyimide or epoxide resin.

10. The organic thin film transistor according to claim 8, wherein the said inorganic material is  $\text{SiO}_2$  or  $\text{SiN}_x$ .

11. The organic thin film transistor according to claim 1, wherein the said organic semiconductor layer (7) is made of N-type or P-type semiconductor material.

5 12. The organic thin film transistor according to claim 11, wherein the said N-type semiconductor material is selected from a group consisting of  $\text{F}_{16}\text{CuPc}$ ,  $\text{F}_{16}\text{CrPc}$ ,  $\text{F}_{16}\text{ZnPc}$ ,  $\text{F}_{16}\text{H}_2\text{Pc}$ , the mixtures thereof, and the eutectics thereof.

13. The organic thin film transistor according to claim 11, wherein the said P-type semiconductor material is selected from a group consisting of  $\text{CuPc}$ ,  $\text{NiPc}$ ,  $\text{ZnPc}$ ,  
10  $\text{H}_2\text{Pc}$ , the mixtures thereof, and the eutectics thereof.

14. The organic thin film transistor according to claim 1, wherein the said organic semiconductor layer (7) is made of a polymer material.

15. The organic thin film transistor according to claim 14, wherein the said polymer material is polythiophene.

16. A process for manufacturing an organic thin film transistor, comprising:

Step 1: sputtering or vaporizing a layer of metal on the substrate and forming it into a gate electrode with the method of photolithography;

Step 2: sputtering or vaporizing a gate insulation film or spin coating a layer of polymer, or sputtering or vaporizing an inorganic film with low dielectric constants as  
20 the dual-gate insulation film;

Step 3: forming a layer of metal with the method of vacuum heat evaporation, then forming it into a source electrode and a drain electrode respectively with the method of photolithography;

Step 4: removing the second insulation film in the channel with the method of  
25 reactive ion etching in dry process using the source and drain electrodes as the mask; and

Step 5: forming an active layer by vacuum heat evaporating an organic semiconductor material, and then shaping it with the method of photolithography and RIE.

30 17. The process according to claim 16, wherein the said metal in Step 1 is

selected from a group consisting of Ta, Ti, W and MO.

18. The process according to claim 16, wherein the said gate insulation film is selected from a group consisting of  $Ta_2O_5$ ,  $Al_2O_3$ ,  $TiO_2$ , BZT.

19. The process according to claim 16, wherein the said polymer material is  
5 selected from a group consisting of poly(methyl methacrylate), polyimide, polyvinyl alcohol and polyvinylidene fluoride.

20. The process according to claim 16, wherein the said inorganic film is selected from a group consisting of  $SiO_2$  and  $SiN_x$ .

21. The process according to claim 16, wherein the said metal in Step 3 is  
10 selected from a group consisting of Au, Ag, Mo and Al.